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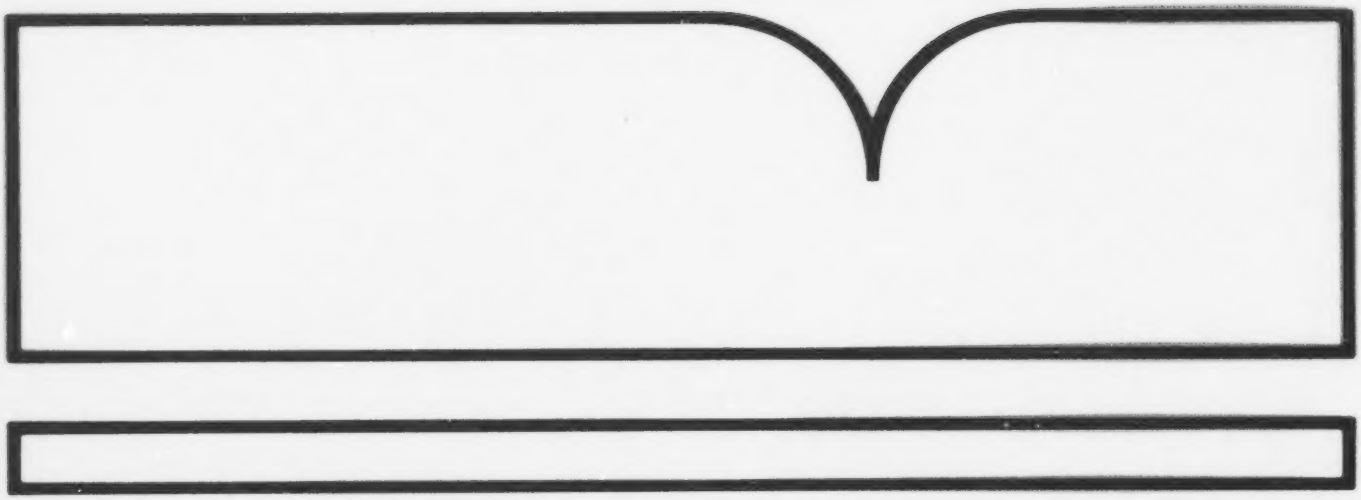

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In order to carry out the intention of the Amendments to reduce the generation of hazardous waste in the U.S., the EPA has developed a multi-faceted hazardous waste minimization program. This program, which includes information gathering, research, development and demonstration, support of state waste minimization programs, technology transfer activities, waste minimization assessments, and extensive communications with universities, states, and the general public, is discussed in this paper.

The program described in this paper is focused on minimizing the generation of hazardous waste. However, the Agency believes that the waste minimization concept can and should be applied to all releases to air, water, and groundwater.

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# The U.S. EPA Hazardous Waste Minimization Program

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## Introduction

The passage of the 1984 Amendments to the Resource Conservation and Recovery Act marked a strong change in the United States' policies concerning hazardous wastes. In addition to authorizing very stringent treatment and disposal regulations, the Amendments also contained as the nation's top waste management priority a redirection towards "waste minimization" as a preferential strategy for encouraging improvement in environmental quality.

In order to carry out the intention of the Amendments to reduce the generation of hazardous waste in the U.S., the EPA has developed a multi-faceted hazardous waste minimization program. This program, which includes information gathering, research, development and demonstration, support of state waste minimization programs, technology transfer activities, waste minimization assessments, and extensive communications with universities, states, and the general public, is discussed in this paper.

The program described in this paper is focused on minimizing the generation of hazardous waste. However, the Agency believes that the waste minimization concept can and should be applied to all releases to air, water, and groundwater.

Waste Management Hierarchy

EPA's definition of waste minimization includes source reduction and recycling, the first two elements in the Waste Management Hierarchy shown in Table 1. Source reduction and recycling each are comprised of such practices and procedures as those shown in Figure 1.

Table 1
Waste Management Hierarchy

- **Source Reduction:** the reduction or elimination of hazardous waste at the source, usually within a process. Source reduction measures include process modifications, feedstock substitutions, improvements in feedstock purity, housekeeping and management practice changes, increases in the efficiency of equipment, and recycling within a process.

- **Recycling:** the use or reuse of hazardous waste as an effective substitute for a commercial product or as an ingredient or feedstock in an industrial process. It includes the reclamation of useful constituent fractions within a waste material or the removal of contaminants from a waste to allow it to be reused.

- **Treatment:** any method, technique or process which changes the physical, chemical or biological character of any hazardous waste so as to neutralize such waste, to recover energy or material resources from the waste, or so as to render such waste non-hazardous, less hazardous, safer to manage, amenable for recovery, amenable for storage, or reduced in volume.

- **Disposal:** the discharge, deposit, injection, dumping, spilling, leaking, or placing of hazardous waste into or on any land or water so that such waste or any constituents may enter the air or be discharged into any waters, including groundwater.

Background

The Hazardous and Solid Waste Amendments of 1984 (HSWA) contain several specific elements for encouraging waste minimization as a preferable strategy alternative for improving the quality of the environment. It contains a statement of national policy that states,

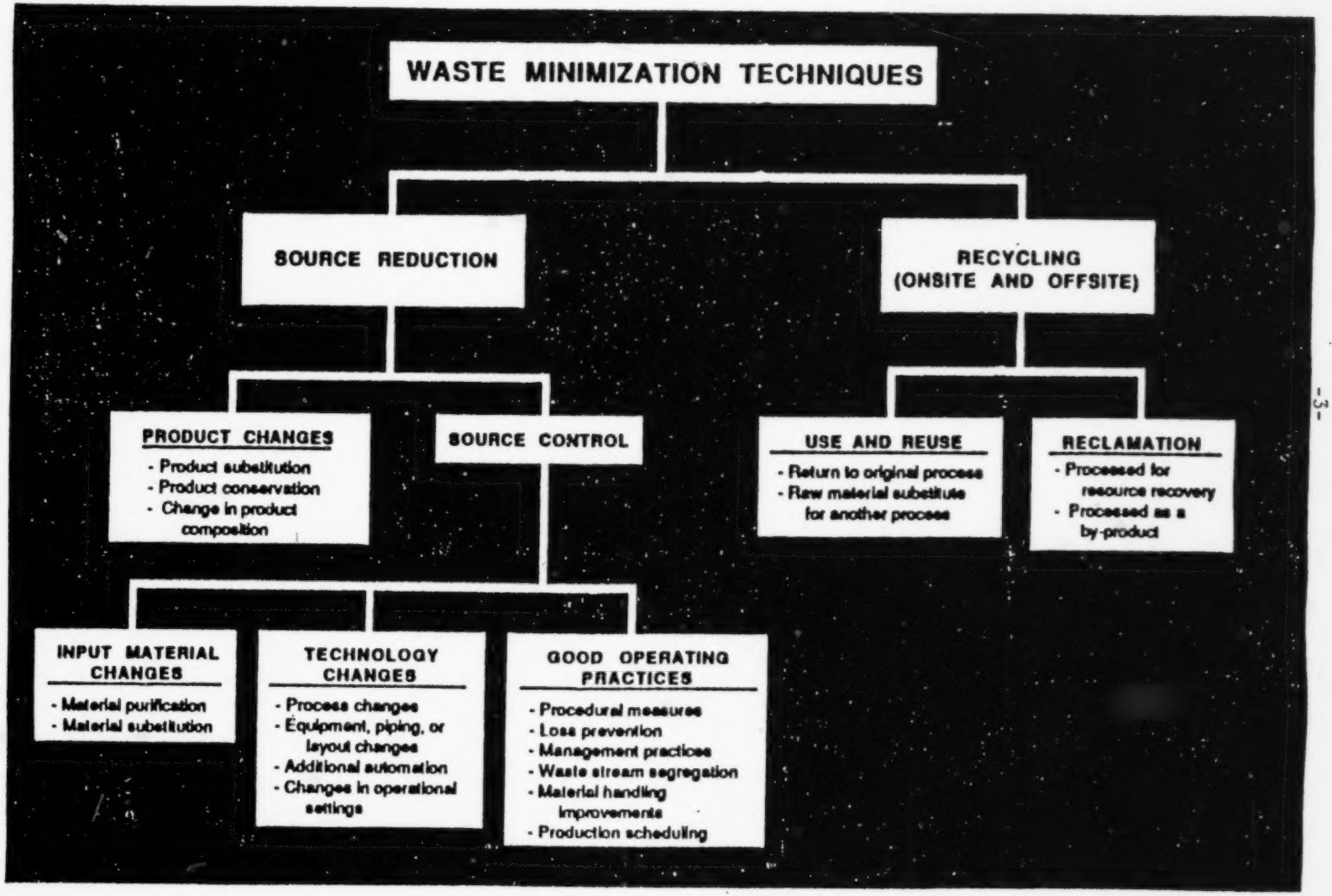


**Figure 1** Waste Minimization Techniques

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"The Congress hereby declares it to be the national policy of the United States that, wherever feasible, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible. Waste that is nevertheless generated should be treated, stored, or disposed of so as to minimize the present and future threat to human health and the environment."

It has three statutory requirements for generators to:

- Certify on their waste manifests that they have in place a program "to reduce the volume or quantity and toxicity of such waste to the degree determined by the generator to be economically practicable."
- Make the same certification in relation to any new permit issued for treatment, storage, or disposal of hazardous waste; and
- Describe in a biennial report to the EPA, any waste minimization program and accomplishment during the reporting period.

HSWA also directed the EPA to prepare a report to the Congress on whether it was desirable or feasible to develop mandatory requirements, such as national regulations, to compel adoption of waste minimization techniques.

Report to Congress - Minimization of Hazardous Waste

The EPA Report to Congress on the Minimization of Hazardous Waste (EPA 530-SW-86-033) was submitted by the EPA to the Congress in October 1986. In this report the agency explored many technical economic and policy issues pertinent to reducing waste generation and concluded that it would be counterproductive for EPA to establish a mandatory program for waste minimization at this time.

The conclusion was based on three key factors. First, mandatory programs would second-guess industry's production decisions, quite possibly leading to counterproductive results. Second, mandatory programs would be difficult and expensive to design and administer. Third, generators already face strong economic incentives to reduce their wastes. A regulatory program would take time to develop and many industries might postpone any action until mandatory requirements were spelled out.

The Report to Congress stressed that the most constructive role government can assume is to promote voluntary waste minimization by providing information, technology transfer, and assistance to waste generators.

The report further concluded that even though a mandatory regulation program is not needed "aggressive action in favor of waste minimization is clearly needed." A three point strategy was outlined to guide the Agency in preparing an aggressive program.

1. **Information Gathering:** Detailed data on industry's response to the land disposal restrictions program and other existing waste minimization incentives would be gathered in order to make a final determination on the desirability and feasibility of performance standards and required management practices.

2. **A Core Waste Minimization Program:** During the interval when the new provisions of HSWA are taking effect, EPA would launch a strong technical assistance and information transfer program through the States to promote voluntary waste minimization in industry, government, and the non-profit sectors of the economy. It would also work with Federal agencies to encourage procurement practices that promote the use of recycled and reclaimed materials.

3. **Longer Term Options:** Based on an analysis of the new data gathered under (1), performance standards and other mandatory requirements could be imposed, if necessary, once the HSWA amendments have taken full effect and their impacts on waste generation have been assessed.

Since the issuance of the Report, the EPA has established a working group with representatives from various organizations within the Agency and began to convert into action the goals and recommendations of the Report. Various offices within the Agency have assumed responsibility for different parts of the strategy and begun initiating the necessary activities.

Waste Minimization Program Elements

The EPA's national program to effect waste minimization is based on the five elements listed below.

- Promote waste reduction by transferring technical information to firms and state technical assistance officers.

- Encourage the adoption of waste reduction by identifying, evaluating, and demonstrating appropriate technologies and by encouraging the use of waste minimization assessments.

- Advise Congress on national progress of waste minimization.

- Foster development of state waste minimization programs.

- Develop outreach and communication programs with the goal of raising awareness of the benefits of waste minimization within government, industry, and the public.

Agency Waste Minimization Activities

Various offices within the Agency have undertaken projects and activities to contribute to furthering the achievement of the Agency's goals in waste minimization.

National Waste Minimization Data Base

One of the conclusions of the Report to Congress was that there did not exist an adequate information base to assess how much progress could be made by adopting waste minimization regulations. To remedy this, the agency has recently undertaken several major surveys that will provide an indication of current waste minimization activities, and provide data for the 1990 Report to Congress.

The major surveys for the first time will produce a snapshot of the current status of hazardous waste minimization efforts in the U. S. The first survey, referred to as the Generator Survey, which requests waste minimization data from approximately 10,000 hazardous waste generators, will provide a baseline

against which to measure future trends. A second survey, the TSDF survey, will gather information on the amount of recycling that is occurring at approximately 1500 treatment, storage, and disposal facilities in the U.S. In addition, EPA is collecting data on waste minimization practices from 20,000 hazardous waste generators under the statutorily mandated RCRA biennial survey, that will allow measurement of trends in waste minimization against the information collected in the baseline surveys. Finally, EPA is collecting limited information on waste minimization practices, for reductions in releases to all media under the community right to know provisions of the Superfund law. These surveys, together with the future biennial report data, will vastly improve the ability to measure trends in hazardous waste minimization and spot areas that deserve special attention.

Policy Development

A national policy on waste minimization is now being drafted within the Agency for publication in the Federal Register. The publication will lay out the Agency's definition of waste minimization, and the goals of developing a multi-media strategy. To support the development of this policy statement, a work group comprised of states, industry representatives, and environmental groups has been convened. This work group will provide first hand, immediate feedback on the different elements of a national strategy proposed to minimize waste. The Agency is also taking a critical look at its existing environmental statutes and regulations in order to pinpoint any incentives or disincentives contained in them that may affect the nation's efforts to minimize waste. In this context, the Agency will

also examine current regulations to see if, in the name of waste minimization, they simply shift waste from one medium to another without realizing any environmental or health benefits.

Technology Transfer & Clearinghouse Activities

In order to facilitate the dissemination of the type of information necessary to effect waste minimization, the Agency is supporting several projects. The design for a technical assistance clearinghouse has begun. The clearinghouse is to serve as a repository for technical information on source reduction and recycling practices developed by states, industry, universities, and the EPA. The system is being developed principally for state technical assistance staffs that get calls from medium and small firms that do not otherwise have ready access to technical options for source reduction and recycling. However, the data base will be made available to all interested parties. To further this effort, a pilot program has been installed within several states.

We are also exploring the use of fact sheets in conjunction with a waste minimization hotline and a newsletter to allow for rapid transmission of information. Also being explored is the possibility of an active computer based network for waste minimization information.

Waste Minimization Audit Manuals

In 1988 the Agency published a manual (EPA 600/2-88-025) for small and medium sized firms to use in conducting waste minimization assessments, which are procedures, sometimes called audits, that are useful in determining opportunities for waste reduction in a generator's facility. In testing

the procedures recommended in the manual we found that in nearly all cases businesses could use it to identify practicable and effective ways of minimizing waste.

During the next several years the Agency will support several projects to demonstrate the use of the manual in a variety of industries. The EPA will, in cooperation with the California Department of Health Services, also produce several industry specific assessment manuals during this time (Table 2). All of these projects are designed to encourage the use of assessments as an active tool for reducing waste.

Table 2

US EPA/CALIFORNIA DOHs Waste Minimization Assessment Manuals

- Pesticide Formulators
- Paints & Coatings
- Circuit Board Manufacturers
- Automotive Repairs
- Automotive Paint Shops
- Photographic Processing Labs
- Commercial Printing
- Educational, Scientific, & Research Institutions
- Hospitals
- Fiberglass & Rigid Plastic Products

Outreach Programs

Recognizing the importance of communication and training, the EPA has developed several significant outreach projects. A brochure entitled "Waste Minimization Environmental Quality with Economic Benefits" (EPA 530-SW-87-026) was published in October 1987. This brochure has proven very popular and is recognized as a considerable contribution to raising the awareness of the country to the potential of waste minimization. A video on the subject for the general public is also now under development.

The EPA has arranged several workshops for representatives of industry, the states, and environmental organizations to exchange views on national priorities and activities. A workshop for practitioners on solvent waste reduction was held in five cities throughout the country. A similar series of workshops on use of the EPA manual for waste minimization assessments is presently under development.

The EPA Regional Offices have initiated several outreach activities and will be working with other parts of the Agency in distributing the manuals now under development and in carrying out the waste minimization assessment seminars.

Research and Demonstration

To encourage the identification, development, and demonstration of processes and techniques that result in less waste being generated, the Agency has initiated the programs outlined in Table 3. These programs are designed to be the cornerstone of the Agency's waste minimization research and demonstration program and will provide sorely needed data on new technologies to the generating sectors.

TABLE 3

Waste Minimization Research Program

- The Waste Reduction Innovative Technology Evaluation (WRITE Program

  A program to identify, evaluate and/or demonstrate new ideas and technologies that lead to waste reduction. The WRITE Program is a program to involve the EPA with private industry and other organizations to encourage the development and/ or demonstration of effective techniques and technology for hazardous waste minimization.

TABLE 3 (continued)

- The Waste Reduction Assessments Program (WRAP)

  A program to demonstrate the EPA Waste Minimization Opportunity Assessment Procedure and encourage the use of waste minimation assessments. The WRAP program is designed to encourage the use of waste minimization assessment as a tool for identifying options for reducing waste. It supports activities to demonstrate the procedure in various industrial settings.

- The Waste Reduction Evaluations at Federal Sites (WREAFS)

  A program to develop cooperative waste minimization technology demonstration projects with other Federal agencies. WREAFS provides a structure for involving the EPA in a wide variety of projects already being funded by other Federal agencies.

- The Waste Minimization Institute

  A joint University/EPA sponsored institute comprised of senior individuals knowledgeable in the principles and practices of waste minimization to counsel the EPA with respect to its waste minimization activities and to serve as liaisons to private industry generators that the Agency wishes to encourage to adopt and demonstrate waste reduction techniques.

Waste Minimization Benefits Manual

EPA has developed a manual, now in draft form, which will enable companies to analyze the cost savings from waste minimization projects. Generators of hazardous waste have told EPA that waste minimization projects frequently are not funded because the estimated benefits do not include such variables as avoided regulatory or liability costs. This manual illustrates how to calculate the true cost of waste management and how to estimate a wider range of benefits from reducing wastes generated across all media.

State Program Support

The EPA has decided that State agencies are in the best position to tailor waste minimization programs according to the specific mix of waste streams and the specific types of environmental problems they are facing. The EPA endorses state programs and is an active participant in the state Roundtable of Waste Reduction Programs, the primary network of state agencies working to encourage waste minimization. Once state programs are established, the lessons learned by individual states can be shared with others experiencing similar problems.

This summer EPA will be awarding three million dollars in RCRA Integrated Training and Technical Assistance Initiative (RITTA) grants to ten to fifteen states for the purpose of setting up waste minimization training for state personnel working in hazardous waste programs. While RITTA grants can be used for any training activity, as long as it pertains to hazardous waste, EPA has decided to commit all of the available RITTA funds to hazardous waste minimization. To receive the funds, states must develop long-term plans for training and technical assistance programs, as well as implement pilot technical assistance projects targeted at the regulated community.

This fall EPA will issue an additional three million dollars in grants to states for the purpose of helping them set up state-run technical assistance programs. In contrast to the RITTA grants, this funding will be used for waste minimization across the board--not just

for hazardous waste minimization. This funding, which will be used by states as seed money to help establish their programs, will complement the RITTA training grants.

Conclusion

Waste minimization is an essential element of the nation's immediate and long-term strategy to manage hazardous waste. EPA's strategy to minimize the generation of hazardous waste will help reduce or eliminate regulated wastes that are now managed by treatment or land disposal as well as other wastes that pose risks to human health and the environment. Land disposal will continue to play a role, but that role is diminishing. EPA's land disposal restrictions program, established in response to the 1984 amendments to RCRA, will ban the land disposal of many untreated hazardous wastes, forcing generators to explore other options. Treatment technologies can assume much of the waste management burden from land disposal, but treatment is expensive, and, at least in the near term, capacity is limited.